

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A carriage servo control system for servo-controlling a movement of a carriage ~~[[means]] device~~ in a vertical direction to a track formed on a recording medium, in which the carriage ~~[[means]] device~~ has ~~detecting means~~ a detecting device mounted thereon for transmitting an optical beam to the track so as to perform at least one of recording and reproduction of information on and from the track, said carriage servo control system comprising:

~~error signal producing means~~ an error signal producing device for producing an error signal showing an error between a radiated position of the optical beam on the recording medium and a position of the track;

~~periodic signal producing means~~ a periodic signal producing device for producing a periodic signal of which period is constant and previously determined so as to correspond to a movement accuracy of the carriage ~~[[means]] device~~;

~~duty ratio control means~~ a duty ratio control device for changing a duty ratio of the periodic signal on a basis of characteristic of the error signal produced to produce a changed periodic signal having the duty ratio changed;

~~drive signal producing means~~ a drive signal producing device for producing a drive signal to move the carriage ~~[[means]] device~~ on a basis of both the changed periodic signal produced and the error signal produced; and

~~supplying means~~ a supplying device for supplying the drive signal produced to a moving ~~[[means]] device~~ configured to move the carriage ~~[[means]] device~~ in the vertical direction so as to move said carriage ~~[[means]] device~~ by the moving ~~[[means]] device~~ on a basis of the drive signal supplied,

wherein said duty ratio control ~~[[means]] device~~ changes the duty ratio based on a difference between a maximum value and a minimum value of the error signal to produce the changed periodic signal.

2. (canceled)

3. (currently amended) The carriage servo control system according to claim 1, wherein said periodic signal producing [[means]] device produces the periodic signal made up of only a signal component with a frequency not more than a predetermined frequency.

4. (currently amended) The carriage servo control system according to claim 1, wherein said periodic signal producing [[means]] device produces the periodic signal made up of only a signal component with a frequency not more than a predetermined frequency.

5. (currently amended) The carriage servo control system according to claim 1, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partial error signal and the changed periodic signal, said partial error signal serving as the error signal having a value not less than a predetermined threshold value.

6. (currently amended) The carriage servo control system according to claim 1, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partial error signal and the changed periodic signal, said partial error signal serving as the error signal having a value not less than a predetermined threshold value.

7. (currently amended) The carriage servo control system according to claim 3, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partial error signal and the changed periodic signal, said partial error signal serving as the error signal having a value not less than a predetermined threshold value.

8. (currently amended) The carriage servo control system according to claim 4, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partial error signal and the changed periodic signal, said partial error signal serving as the error signal having a

value not less than a predetermined threshold value.

9. (currently amended) The carriage servo control system according to claim 5, wherein said drive signal producing [[means]] device multiplies the changed periodic signal and the partial error signal produced together to produce the drive signal.

10. (currently amended) The carriage servo control system according to claim 6, wherein said drive signal producing [[means]] device multiplies the changed periodic signal and the partial error signal produced together to produce the drive signal.

11. (currently amended) The carriage servo control system according to claim 7, wherein said drive signal producing [[means]] device multiplies the changed periodic signal and the partial error signal produced together to produce the drive signal.

12. (currently amended) The carriage servo control system according to claim 8, wherein said drive signal producing [[means]] device multiplies the changed periodic signal and the partial error signal produced together to produce the drive signal.

13. (currently amended) The carriage servo control system according to claim 1, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partially changed periodic signal and the error signal, said partially changed periodic signal serving as the changed periodic signal and being included within a period previously determined based on the error signal.

14. (currently amended) The carriage servo control system according to claim 1, wherein said drive signal producing [[means]] device produces the drive signal on a basis of a partially changed periodic signal and the error signal, said partially changed periodic signal serving as the changed periodic signal and being included within a period previously determined based on the error signal.

15. (currently amended) The carriage servo control system according to claim 3, wherein said drive signal producing device produces the drive signal on a basis of a partially changed periodic signal and the error signal, said partially changed periodic signal serving as the changed periodic signal and being included within a period previously determined based on the error signal.

16. (currently amended) The carriage servo control system according to claim 4, wherein said drive signal producing device produces the drive signal on a basis of a partially changed periodic signal and the error signal, said partially changed periodic signal serving as the changed periodic signal and being included within a period previously determined based on the error signal.

17. (currently amended) A carriage servo control system according to claim 13, wherein said drive signal producing device multiplies the partially changed periodic signal and the error signal together to produce the drive signal.

18. (currently amended) A carriage servo control system according to claim 14, wherein said drive signal producing device multiplies the partially changed periodic signal and the error signal together to produce the drive signal.

19. (currently amended) A carriage servo control system according to claim 15, wherein said drive signal producing device multiplies the partially changed periodic signal and the error signal together to produce the drive signal.

20. (currently amended) A carriage servo control system according to claim 16, wherein said drive signal producing device multiplies the partially changed periodic signal and the error signal together to produce the drive signal.

21. (canceled)

22. (currently amended) A carriage servo control system for servo-controlling a movement of ~~carriage means~~ a carriage device in a vertical direction to a track formed on a recording medium, in which the carriage ~~[[means]] device~~ has ~~detecting means~~ a detecting device mounted thereon for transmitting an optical beam to the track so as to perform at least one of recording and reproduction of information on and from the track, said carriage servo control system comprising:

~~error signal producing means~~ an error signal producing device for producing an error signal showing an error between a radiated position of the optical beam on the recording medium and a position of the track;

~~periodic signal producing means~~ a periodic signal producing device for producing a periodic signal of which period is constant and previously determined so as to correspond to a movement accuracy of the carriage ~~[[means]] device~~;

~~duty ratio control means~~ a duty ratio control device for changing a duty ratio of the periodic signal on a basis of characteristic of the error signal produced to produce a changed periodic signal having the duty ratio changed;

~~drive signal producing means~~ a drive signal producing device for producing a drive signal to move the carriage ~~[[means]] device~~ on a basis of both the changed periodic signal produced and the error signal produced; and

~~supplying means~~ a supplying device for supplying the drive signal produced to ~~moving means~~ a moving device configured to move the carriage ~~[[means]] device~~ in the vertical direction so as to move said carriage ~~[[means]] device~~ by the moving ~~[[means]] device~~ on a basis of the drive signal supplied,

wherein said drive signal producing ~~[[means]] device~~ produces the drive signal on a basis of a partial error signal and the changed periodic signal, said partial error signal serving as the error signal having a value not less than a predetermined threshold value.

23. (currently amended) A carriage servo control system for servo-controlling a movement of ~~carriage means~~ a carriage device in a vertical direction to a track formed on a recording medium,

in which the carriage ~~[[means]] device~~ has ~~detecting means~~ a detecting device mounted thereon for transmitting an optical beam to the track so as to perform at least one of recording and reproduction of information on and from the track, said carriage servo control system comprising:

~~error signal producing means~~ an error signal producing device for producing an error signal showing an error between a radiated position of the optical beam on the recording medium and a position of the track;

~~periodic signal producing means~~ a periodic signal producing device for producing a periodic signal of which period is constant and previously determined so as to correspond to a movement accuracy of the carriage ~~[[means]] device~~;

~~duty ratio control means~~ a duty ratio control device for changing a duty ratio of the periodic signal on a basis of characteristic of the error signal produced to produce a changed periodic signal having the duty ratio changed;

~~drive signal producing means~~ a drive signal producing device for producing a drive signal to move the carriage ~~[[means]] device~~ on a basis of both the changed periodic signal produced and the error signal produced; and

~~supplying means~~ a supplying device for supplying the drive signal produced to ~~moving means~~ a moving device configured to move the carriage ~~[[means]] device~~ in the vertical direction so as to move said carriage ~~[[means]] device~~ by the moving ~~[[means]] device~~ on a basis of the drive signal supplied,

wherein said drive signal producing ~~[[means]] device~~ produces the drive signal on a basis of a partially changed periodic signal and the error signal, said partially changed periodic signal serving as the changed periodic signal and being included within a period previously determined based on the error signal.